INNER ROLLING PLATFORM FOR MOVING A RIGID CONTAINER WITH A POSITIONING RECEPTACLE

Field of the Invention

The present invention relates to the process of design and manufacture of an inner rolling platform and of a container with a positioning receptacle having a flat convex section. The design is based on providing a ratio of geometric parameters of both constructive formations, which must be moved together so that the inclination insertion and extraction mechanism of the container, provided for inserting and extracting the inner rolling platform into the receptacle of the mentioned container, acts correctly.

The inner inclination mechanism of the container allows the rolling platform to be positioned under and extracted from the container with a positioning receptacle without lifting the container off the platform. Instead, the container is simply tilted from its vertical position, when the inner rolling platform is supported only by the lower convex base of the container positioned inside the inclined circular area of the platform and the central hole of the inner rolling platform, allowing a joint, firm, stable and safe rolling.

This is an essential feature since from an optimized joint design of the positioning receptacle of the container and of the inner rolling platform, they can be configured and manufactured in a simple and reliable manner, assuring non-deformability of both and safe use. The provided design further allows a reduction of costs of manufacture and also of use by making the installation and extraction of the inner rolling platform a virtually effortless activity, minimizing bone and muscle strain of user's limbs and lumbar region of the user's back.

Background of the Invention

The main feature of the inner rolling platform is that it can be installed and extracted by tilting the container, while the container is supported on the ground, and without having to lift it.

Numerous types of conventional rolling platforms are known for moving rigid containers. However, they all have a tremendous use difficulty, accentuated by the high weight of containers when they are loaded, thus causing intense strain in the moment of their outer withdrawal and positioning. Both pressurized metal containers and containers that are neither pressurized nor metal, require to be lifted, placed onto a

conventional platform and positioned such that the peripheral ring of the base of the container is in a correct location, i.e., until it is deposited on a narrow circular strip of the rolling platform. Further, in case of its extraction, the container has to be placed on the ground by first lifting it off the platform, taking it off the conventional rolling platform and, by separating it, placing it on the ground.

Conventional rolling platforms can be seen, for example, in the descriptions contained in utility models ES 0160222 U, ES 0163942 U, ES 0169949 U and in patents DE 518919, US 1,328,458, US 2,808,220, US 2,917,769 US Des. 269,216, US Des. 276,948, US 4,544,173, US Des. 309,811, US 5,110,147, US 5,145,311, US Des. 340,563, US 5,931,149 and US 6293273.

Applicant is aware of the documents confirming that the known rolling platforms support the containers, with or without a positioning receptacle with a flat convex section, only by means of the contour of the peripheral ring or together with its lower convex or flat base. However, Applicant is not aware of a documented existence of any rolling platform invention which only acts by supporting the container with a positioning receptacle with a flat convex section, supported at its lower convex base, and which further uses the inclination insertion and extraction mechanism of the container for inserting and extracting the inner rolling platform, as provided by the object of the present invention.

A joint support configuration in a type of rolling platform is known where the support configuration includes both the concave base of the container, supported by a small surface, and the base of the supporting peripheral ring to support the container on the ground. Further, for installing and dismantling it, the container has to be lifted and the peripheral adjusted until it coincides with a narrow and thin strip, which is further located in a recessed area in which it must be deposited with great difficulty and effort, as described in utility models ES 0155259 U, ES 0160222 U and ES 0169949 U.

Inventions are also known in which the container is only supported on the rolling platform on the edge of the supporting peripheral ring to support the container on the ground, as described in utility model ES 0163492 U, ES 0169803 U and ES 0275089 U and in patents DE 518919, US 266,655, US 2,917,769, US 4,544,173, US 5,931,149 and US 6,293,273.

The background of different rolling platforms described in these documents remain immobile during the processes of anchoring them to their respective containers, except in mentioned patent US 5931149, in which the rolling platform and container tilt outwardly at the moment of their coupling, as occurs in U.S. Patents Nos. US

1,706,253, US 1,706,267, US 1,719,763, US 2,215,529, US 2,723,864, US 3,826,512, US 4,318,655 and US 6,742,790

In contrast, in the invention of the inner rolling platform herein described, it tilts inwardly of the positioning receptacle without any external participation, as it is automatically lifted and lowered from the ground at the lower concave base and vice versa during the process of the mechanism for anchoring and removing the container in the positioning receptacle, which is carried out only gradually by supporting its lower convex base in the inclined circular area and the central hole of the inner rolling platform.

The use of the inner rolling platform can be applied to some pressurized metal recipients existing on the market. For example, it can be applied to are containers used for storage and transport of pressurized liquids or liquefied gases, such as that explained in the preferred embodiment of the invention. This application originally referred to such use as the positioning receptacle with the proper geometric features.

Therefore, this invention provides a new use to the bottom of the lower base of the container or positioning receptacle which originally only has the functions of protecting the base of the container and stabilizing its support on the ground, as can be seen in patents US 1,909,028, US 2,988,258, US 3,348,721, US 3,505,536, US 3,747,799, US 3,840,141, US 3,854,582, US 4,151,927, US 4,294,373, US 4,381,061, US 4,577,775 and US 6,293,273.

There are documents showing a use of the bottom of the lower base of the container for safely coupling a rolling platform. They do so by means of complex insertion and extraction mechanisms, requiring a burdensome handling of the container for placing the rolling platform, as can be seen in patents US 5,074,572, US 5,184,836 and US 5,758,888.

The invention herein described extends the possibility of using the inner rolling platform to other types of containers, besides pressurized containers, by modifying the geometric structure of their conventional bases in suitable positioning receptacles, and maintaining their utility of being supported on the ground and stacked. in some patents such as US 2,272,447, US 2,447,300, US 2,635,775, US 3,235,094, US 3,854,582 and US 4981412.

The simplicity of the design and of the production process and ease of use with minimum effort of the inner rolling platform contrasts with the difficulties of use and tremendous effort required with conventional rolling platforms for the different types of known containers, such as conventional three or four wheeled carriages using complex

mechanisms for lifting heavy containers off the ground to then be able to move them, as described in utility model ES 1045813 U and the following patents: US 2360858, US 2635775, US 3587892 and US 5122027. Or in other cases the transporting carriage and container must be tipped over together until the wheels make contact with the ground, as described in patents such as US 460250, US 1738096, US 1866887 and US 2160041.

In the case of two wheels, the heavy container must be lifted in order to place it at the base of the carriage and then tip over the carriage and container together to move them, supporting the effort of holding the container inclined on the carriage and their movement. Examples of both actions are described in utility models ES 0292289 U and patents GB 1025705, GB 2069454, US 879914, US 957840, US 1300567, US 1517901, US 1704769, US 1719763, US 1820728, US 2447300, US 2272447, US 2650834, US 2723864, US 3075662, US 3503623, US 3845968, US 3376986, US 4802681 and US 4981421.

Description of the invention

The present invention is a system of an inner rolling platform and container with a positioning receptacle creating an inclination mechanism of the container. It allows placing and extracting an inner rolling platform to and from a container with a suitable positioning receptacle having a flat convex section so as to be able to move it without having to lift it off the ground.

The inner rolling platform is formed by a cylindrical base and four or more multidirectional wheels.

The cylindrical base has the shape of a rather shallow cupel, the maximum operative diameter of which is10% less than the inner diameter of the supporting peripheral ring supporting the container on the ground.

The cylindrical base is divided into two areas: the circular crown and the central circular groove, which in turn consists of an inclined circular area and a central circular hole.

The circular crown is the peripheral area of the inner rolling platform, and is where the four or more multidirectional wheels are placed in a perpendicular and symmetrical manner and secured by rivets or screwed joints.

In the center of the circular crown there is a central circular groove with an inclined circular area inclined at an angle identical to that the incline angle of the concave lower base of the container, and having a width demarcated by a difference

between its outer and inner diameters of at least 12%.

In the center of the central circular groove, there is a wide circular hole with a diameter of at least half the total diameter of the cylindrical base.

The height of the wheels and the diameter of the inclined circular area of the cylindrical base of the inner rolling platform determine the level of its placement in the lower convex base of the container, which will be up to 20% of the height or rise of its concavity and define the free height of the lower edge of the container to the ground, with the inner rolling platform installed. The free height is within 8 mm to 14 mm, depending on the type of activity surface and the load capacity of the container. Accordingly, wheels with a different diameter and load capacity may be used.

The total height of the inner rolling platform is a determining factor in the operation of the mechanism for its placement and extraction of the container by tilting, as it defines an interval of optimal values with which the mentioned platform can be installed and dismantled without difficulties, i.e. it tilts and is coupled to or released from the container without any obstacles.

The container includes a positioning receptacle with a flat concave section, necessary for being able to use the inner rolling platform, and formed from the lower convex base of the container. The convex base of the container is enclosed by a supporting peripheral ring of the receptacle for supporting the container on the ground. The flat concave section drops from the upper base edge down to 2/3 of the receptacle's height. A ratio, between the lengths of the chord or width and the rise or height of the flat convex section is less than 5.25.

The angular similarity of the inclined placement sections of the inner rolling platform and of the lower convex strip of the container, allows both elements to be coupled in a stable, firm and safe manner.

Although this constructive configuration with a positioning receptacle with a flat convex section already exists in the metal pressurized containers present on the market, it only has functions of vertical support on the ground. By the invention of the inner rolling platform, it can be applied to any type of moving containers which are manufactured by incorporating the described positioning receptacle.

The basic constructive feature of this invention is the interrelation of the total height and diameter of the inclined circular area of the inner rolling platform with the curve and height of the convex base of the positioning receptacle of the container, defining the optimal values with which the mentioned inner rolling platform can be installed and dismantled in the concave base of the container without any obstacles.

The inner rolling platform is characterized in that the interaction of its geometric parameters and those of the positioning receptacle of the container alllow for correct operation of the inclination installation and extraction mechanism for installing and extracting the inner rolling platform, without lifting the container. The invention can be implemented by a calculation program providing functional constructive formations of both as end products. These end products can be manufactured in different ways, e.g., by molding, assembly, cutting or deep-drawing of a completely or mainly metal, plastic, vitreous, ceramic, wood or fiber material, and can include various shapes of the containers, such as a barrel, box, tin, chest, cupboard, can, drum, cask or tank.

The production process of the inner rolling platform begins with defining the end product, specified by the constructive configuration. With a thick disc shape, when the construction material is molded plastic, or with a cylindrical base shape for when the type of construction material is thin and cold-rolled steel sheet metal, i it is necessary to improve the mechanical characteristics due to static force for the purpose of resisting evident concentrations of stress due to the existence of the central hole and the location in its periphery of the compression load it must support. A minimum elastic capacity and no permanent deformation is achieved by means of the shall cold deep-drawing forming system and simple formation in a single step, that facilitates construction of the dies for such type of deep-drawing and the level of improvement of the production of the press. Both therefore allow reducing operative costs.

Starting from a joint design of the positioning receptacle of the container and of the inner rolling platform, they can be manufactured in a simple and reliable manner, assuring the non-deformability of both, safe use, and a reduction of manufacturing costs. A strong end product with a high margin of safety under the mechanical demands of the typical operative conditions of the inner rolling platform is thus obtained so that moving the container with a positioning receptacle with or without a load is very reliable, stable, simple, fast and requires little effort during the installation and extraction of the inner rolling platform , minimizing bone or muscle strain in the limbs and lumbar region of the back.

By means of the system for which protection is sought, the inner rolling platform is placed easily and with little effort in and under its positioning receptacle by simply tilting the container, without lifting it off the ground, and in the gradual return travel of the tilting, as the concave section of the base of the positioning receptacle of the container gradually enters the inclined circular area and the central hole of the inner rolling platform, up to the moment in which it tilts from the ground towards the lower

convex base, it stops when the container is fully vertical. The inner rolling platform then returns to the ground and both are installed in the mentioned lower convex base of the mentioned container.

With the container being completely vertical, the inner rolling platform is completely coupled to the container and reliably and safely holds the container which, regardless of its load condition, can both perform a smooth, firm and stable rolling movement.

The mentioned mechanism also acts in the reverse direction allowing the extraction of the inner rolling platform installed inside the positioning receptacle of the container only by inclining the container, and then simply grabbing the mentioned platform which, due to the joint action of the convex base of the positioning receptacle of the container and of the inclined circular area and of the central hole of the inner rolling platform, is simply released.

All these previous actions are carried out without any external participation; they are only the consequence of the properties of the improvement of the invention.

Brief Description of the Drawings

A series of drawings which aid in better understanding the invention and which are expressly related to an embodiment of said invention, are presented as an illustrative and non-limiting example thereof, and will be very briefly described below.

Figure 1 shows an elevational longitudinal section view of the inner rolling platform formed by a cylindrical base and multidirectional wheels where the base is obtained by a deep-drawing process.

Figure 2 shows an upper plan view of the inner rolling platform.

Figure 3 shows an elevational longitudinal section view of the inner rolling platform (obtained by molding), together with the metal pressurized container, in positions corresponding to the beginning of the installation of the inner rolling platform, or at the end of the extraction of the mentioned platform.

Figure 4 shows an elevational longitudinal section view of the inner rolling platform obtained by means of molding, along with the metal pressurized container, in positions corresponding to the middle of the installation of the inner rolling platform, or the middle of the extraction of the mentioned platform.

Figure 5 shows an elevational longitudinal section view of the inner rolling platform (obtained by molding), with the metal pressurized container, in positions representing the end of the installation of the inner rolling platform, or the beginning of

the extraction of the mentioned platform.

Figure 6 shows a lower plan view inferior of the inner rolling platform, (obtained by a deep-drawing process), along with the metal pressurized container, in the same positions shown in Figure 4.

Description of a Preferred Embodiment of the Invention

A particular embodiment of the invention will be described below in reference to the attached drawings.

Starting from the existence on the market of containers with a positioning receptacle, such as the metal pressurized containers for liquids or LPG, the latter will be used as a reference. Specifically focused on a domestic butane type bottle (Figures 3, 4 and 5), an operative embodiment can be extrapolated to any optimization process of the design and manufacture of a container with a positioning receptacle and the subsequent optimization process of the design and manufacture of its corresponding inner rolling platform, adapting its constructive geometric parameters to those of the positioning receptacle of the mentioned butane bottle (4 and 7 in Figures 3, 4 and 5).

The positioning receptacle of the butane bottle has the minimum dimensions necessary so that the action of the inclination placement and extraction mechanism for placing and extracting the container of a suitable rolling platform is possible.

The essential parameters defined by these minimum dimensions (7 and 8 in Figures 3, 4 and 5) are the spherical segment penetrating up to 2/3 of the height of the supporting peripheral ring on the ground (9 in Figures 3, 4 and 5) and also the dimensionless ratio between the chord or width and the rise or height of the spherical segment (8 in Figures 3, 4 and 5) is of 5.19.

For the inner rolling platform to enter in the positioning receptacle of the butane bottle, the latter is first inclined up to 68° on the ground (h in Figure 3), using as a fulcrum an area of the edge of the peripheral ring supported on the ground (8 and 9 in Figure 3). As the lifting of the bottle advances, the surface of the fulcrum gradually decreases until it is reduced to a small arc.

The short travel necessary for this inclination mechanism of the container and the continuous support of the container on the ground make the effort necessary for the tilting less by an order of magnitude.

The inner rolling platform (4 in Figure 3) is then grabbed and placed, without having to position it, under the positioning receptacle of the butane bottle (7 and 8 in Figure 3), so that once this positioning has ended, the inclined butane bottle

progressively returns to its vertical position (8 in Figures 5 and 6), and the inner rolling platform (4 and 8 in Figures 5 and 6) is installed.

During this return travel of the tilting, the inclination installation and extraction mechanism for installing and extracting the butane bottle acts when the lower concave base of the butane bottle (8 in Figures 3, 4 and 5) is directed towards the inclined circular area and the central hole of the inner rolling platform (5 in Figures 3 and 4), until they both make contact on 80° in relation to the ground (i in Figure 4), starting the tilting of the inner rolling platform (4 in Figure 4). At this time, the platform passes, with certain clearance due to the possible dents, through the circular base of the inner edge of the supporting peripheral ring for supporting the bottle on the ground (4 and 9 in Figure 3, 4, 5 and 6). According to the type of supporting peripheral ring and conditions of use, the inner edge and a short flange can reduce the available inner diameter up to 265 mm

With the inner rolling platform coupled to the lower convex base of the butane bottle (4 in Figure 4), the return movement of the tilting of the butane bottle continues until it is completely vertical (4 in Figure 5), the inner rolling platform thus being installed.

Likewise, to extract the inner rolling platform from inside and under the positioning receptacle of the butane bottle (4 and 8 in Figure 4), the inclination installation and extraction mechanism for installing and extracting the butane bottle acts inversely by means of the geometric conjunction of the inclined circular area and of the central hole of the inner rolling platform (5 and 6 in Figure 5) and the lower concave base of the butane bottle (8 in Figure 5). When the inner rolling platform is installed, and the butane bottle together with the inner rolling platform (4 and 8 in Figure 4) are inclined, both continue to be inclined together until reaching 10° from the ground (h in Figure 3), at which time the inner rolling platform is released. The platform then can be grabbed when the butane bottle has been inclined up to 22° from the ground (4 in Figure 3) and the butane bottle returned to the vertical position.

The essential dimensions of the inner rolling platform include of the cylindrical base (4 in Figures 1 and 2) being narrow with a height of 10 mm (and in Figure 1), and having a maximum operative outer diameter of 260 mm (d in Figure 1).

The inclined circular area (6 in Figures 1 and 2) has a height of 10 mm, about 68° of inclination in relation to the vertical axis (136° in Figure 1), the outer diameter (b in Figure 1) of 160 mm and the inner diameter (c in Figure 1) of 140 mm.

The other functional parameter of the inner rolling platform is the total height (g

in Figure 1), determined by its thickness, which in this case is steel sheet metal of 1.2 mm, and by the total height of the multidirectional wheels of 44 mm. The wheels are perpendicularly inserted and symmetrically distributed in the peripheral area of the cylindrical base (2 and 3 in Figures 1 and 2).

This height of the wheels refers to the dimensions of several parameters, such as the height of the wheel support (f in Figure 1) of 34 mm, and the free height of the edge of the butane bottle to the ground with the inner rolling platform in place (figure 4) of 14 mm. The inner diameter of the central hole (5 in Figures 1 and 5) is 140 mm.

This set of constructive parameters of the inner rolling platform allows placing it in the convex base of the positioning receptacle (8 and 5 in Figures 3 and 4), being lifted and freely tilted without obstacles on its inner wheels (2 in Figure 3).

The previously defined constructive features and the parameters make the geometric combination between the sections, the flat convex section of the positioning receptacle of the container (7 and 8 in Figures 3, 4 and 5) and inclined circular area and of the central hole of the inner rolling platform (5 in Figures 3, 4 and 5), allow the latter to be lifted and tilted during the coupling action (4 in Figures 3, 4 and 5) inside and under the positioning receptacle of the butane bottle, and also during its functional tilting (7 and 8 in Figures 3 and 4).

The inner rolling platform is firmly held and supported in a reliable and safe manner to the butane bottle on the inclined circular area and the central hole of the platform (6 and 8 in Figure 4) given the equal slope of both placement surfaces.

The inner rolling platform is thus positioned, without slipping and without the lower edge of the bottle rubbing on the ground, both being able to be easily moved.

Therefore, since the butane bottle does not have to be lifted, exerting an excessive effort of placing the loaded bottle on conventional rolling platforms, which is very difficult and burdensome, is avoided.

The system according to the present invention of the inclination mechanism of the container for inserting and releasing the inner rolling platform in the container with a positioning receptacle allows extending its use to any type of containers which are currently manufactured for storing and transporting pressurized liquids, LPG and other liquefied gases, and also to those which are manufactured for this purpose in the future with the suitable features of the positioning receptacle.

The combination of functional parameters of the inner rolling platform and of the positioning receptacle of the butane bottle allows placing and extracting the latter in an easy, reliable and safe manner making virtually no effort using the inclination

mechanism of the butane bottle, and simply inclining it up to 68° from its initial vertical position.

The materials and type of manufacture used are independent of the object of this invention. Therefore the inner rolling platform and the container can be manufactured by deep-drawing, hydroforming, molding, assembly or cutting of a completely or mainly metal, plastic, vitreous, ceramic, wood or fiber material. Finally, they may have shapes other than circular, such as elliptical or polygonal.